Lessons Learned from the 1989 Exxon Valdez Oil Spill

- Think long term regarding impacts and recovery *(1-2 decades)*
- Consider both offshore marine and coastal ecosystems and multiple levels of food chain
- Natural variation in marine and coastal ecosystems will confound understanding of recovery
- Pre-spill data critical for assessing injury to resources and recovery

USGS

USGS Baseline Data

Florida Shelf Ecosystems: Habitat baselines for use in GOM Deepwater Horizon Oil Spill

Example: the Coast off Broward County

http://coastal.er.usgs.gov/flash/broward/br_small.html

The US Geological Survey partnered with Coastal Planning and Engineering (CPE) to present data collected and prepared for Broward County. The data were collected for beach renourishment projects in 2001 and 2006 and provide baseline information of the environments and ecosystems off of Broward county.

The data have been organized

- Biological constituents: vi photos
- Laser bathymetry (LADS
- Manmade structures and
- Bathymetric contours

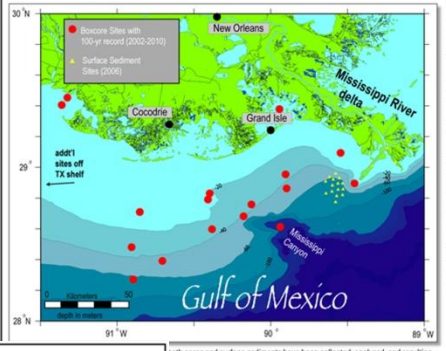
The biological constituents Broward county coast have and video files associated w

USGS

Assessing potential environmental impacts of the Deepwater oil spill along the land/sea boundary in the northern Gulf of Mexico

Brief Description of Team Activity:

Sediment surface samples and cores recovered from the Louisiana Shelf from 2002 – 2010 have been used to evaluate the history and processes associated with the seasonal hypoxic zone near the Mississippi Delta. Samples taken from the cores and surface sediments have been examined for foraminifers (single celled organisms that are sensitive to environmental conditions) and a variety of geochemical indicators (radio- and stable isotopes and trace metals). Temporal framework for the cores has been established and the history of low oxygen bottom water events, benthic foraminifer communities, and geochemical variability has been documented for the last century.



Potential applicability to Deepwater Horizon Event:

The existing data set from the surface sediment samples and cores (Fig. 1) combined with information derived from analyses of selected samples for petroleum derivatives provide an extensive and well-documented baseline data for a pre-/post- event survey to assess the impact of the oil spill on the shelf environment and benthos on the Louisiana Shelf.

We will resample sediments and shoreline wetland deposits in this area of the Louisiana Shelf to assess the distribution and impact of the Deep Horizon Oil spill. Periodic repeat sampling of a network of sites should be done to help document the transient effects (change and recovery) of the oil on benthic habitats.

oth cores and surface sediments have been collected, analyzed, and resulting

Effects of Building a Sand Barrier Berm to Mitigate the Effects of the Deepwater Horizon Oil Spill on Louisiana Marshes

By Dawn Lavoie,[1] James G. Flocks,[2] Jack L. Kindinger,[2] A.H. Sallenger, Jr.,[2] and David C. Twichell[2]

led to
s Hewes
more
insuf-
uisiana's
r the
eroding
will capture
nd focus
ocesses)
WR,
outh of
) km with
Proposed
iggest that
roximately
in the
ion cubic
has less
planned
ons from
ode
l restora-
ier islands
nd habitat.

The proposed project originally involved removing sediment from a linear source approximately 1 mile (1.6 km) gulfward of the barrier islands and placing it just seaward of the islands in shallow water (~2-m depth where possible) to form a continuous berm rising approximately 6 feet (~2 m) above sea level (North American Vertical Datum of 1988—NAVD88) with an ~110-yd (~100-m) width at water level and a slope of 25:1 to the seafloor. Discussions within

[1] U.S. Geological Survey, Office of the Eastern Region Executive, Gulf Coast Focus Area Coordinator, Stennis Space Center, Mississippi.

[2] U.S. Geological Survey, St. Petersburg Coastal and Marine Science Center, St. Petersburg, Florida.

Potential Sand Resources

Sand resources along coastal Louisiana both east and west of the active delta are exceedingly scarce. Most suitable borrow material is from point sources within modern nearshore deposits or buried fluvial (river) deposits associated with earlier stages of delta formation (fig. *2A, B*). The following paragraphs highlight the sand sources that may be most suitable for berm construction.

East of the Mississippi River Delta in the Breton Sound

pplication

Point for

Prediction of Barrier-Island Inundation and Overwash: Application to the Gulf of Mexico Deepwater Horizon Oil Spill

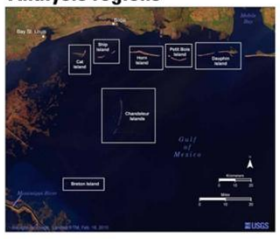
The risk of oil deposition on barrier islands and marshes can be identified by comparing island elevations to models of storm surge and wave runup. The combination of wind-driven surge, astronomical tide, and swash due to breaking waves elevates water levels along the beaches, allowing waves and currents to transport floating oil further landward than would be likely during low tides and calm conditions. The potential exists for water to move across the full width of the islands in locations that are both low and narrow, possibly transporting oil inland into the back bays and marshes.

Ongoing tasks include forecasts of inundation and overwash for a number of weather conditions, including moderate winds, tropical storms, and hurricanes.

For more information:

http://coastal.er.usgs.gov/hurricanes/deepwaterhorizon/

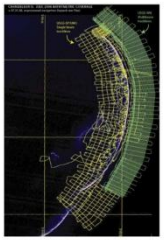
Analysis regions



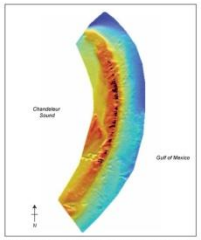
USGS

Data Analysis - Bathymetry and Sidescan Sonar

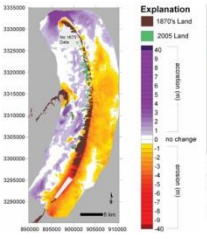
Subbottom Profiling



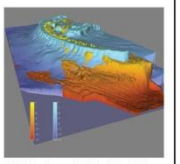
Single-beam (yellow) and multi-beam (green) tracklines collected around the northern Chandeleur Islands in 2006.



Gridded color-shaded relief map of the bathymetric data. Black outlines represent post-Katrina LIDAR survey of the shoreline.



Seafloor change comparison between 2006 and 1880 shows significant erosion on the Gulf side of the islands, and accretion to the north (Hewe's Point). A net loss of 262x10^6 m^3 of sediment has been lost over this time period.



Digital elevation model of Hewe's Pt., looking south, represents the amount of sediment progradation northward since 1880 as the barrier islands migrate in the direction of predominant longshore transport. Courtesy of Mike Miner, UNO.

The first image shows navigation tracklines where the scientists collected bathymetric, CHIRP, and sidescan-sonar data around the Chandeleur Islands. Underlying the tracklines is a pre-Katrina satellite image of the islands, which shows how some of the survey lines cover what was once island.

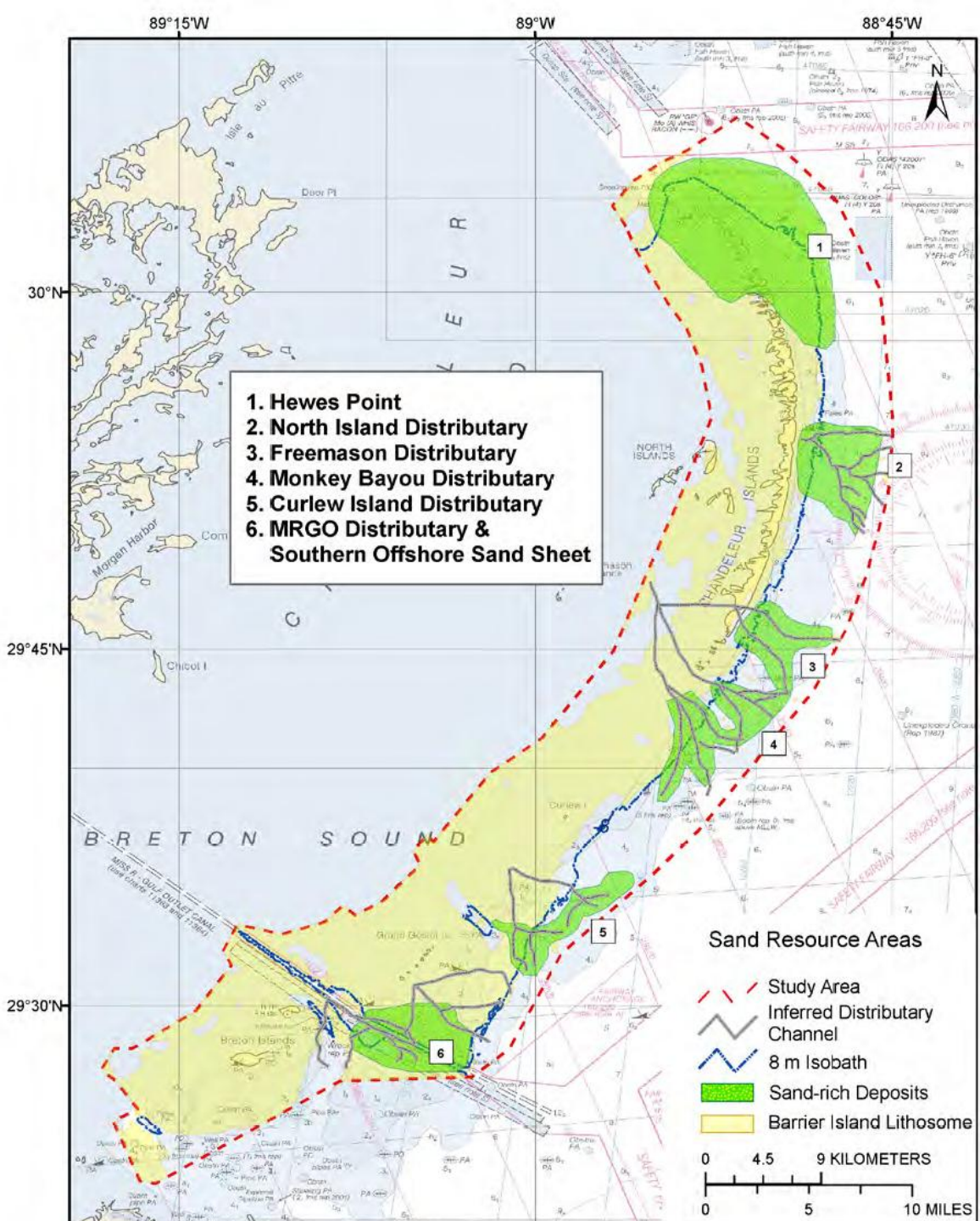
The scale of this survey ranged in water depths from 1 to 15 m for the collection of bathymetric, sidescan, and seismic data. Subbottom-profiling (compressed high-intensity radar pulse [CHIRP]) data to 40 m below the sea floor was also acquired. The bathymetric data was combined with high-resolution elevation data from lidar (light detection and ranging) surveys flown along the shoreline. The data sets were combined to create a comprehensive topobathymetric map for use in coastal-zone management and as a baseline for assessing future shoreline changes.

USGS

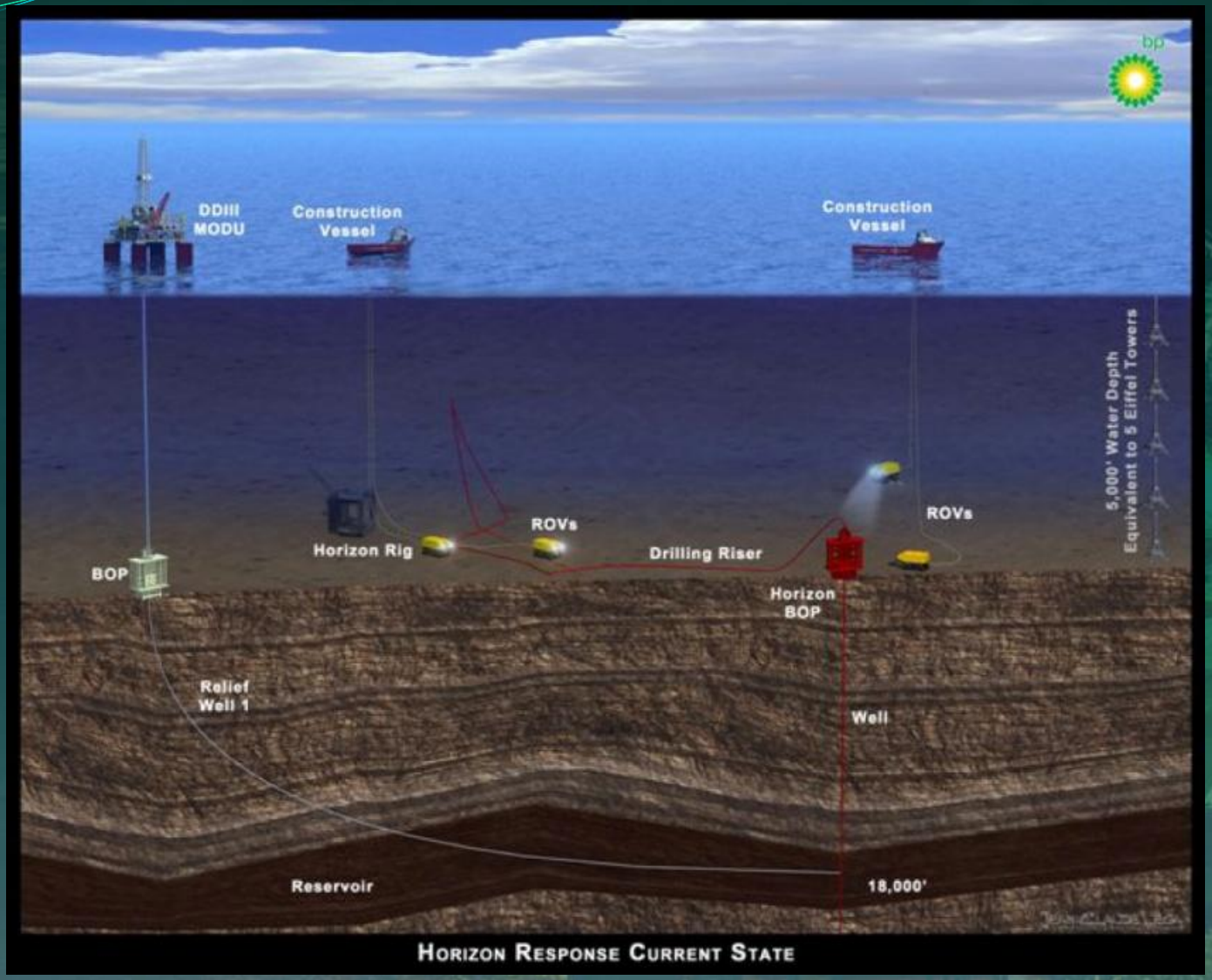
http://ngom.usgs.gov/task2_1/index.php

USGS Open-File Report
2010–1108
June 2, 2010

Effects of Building a Sand Barrier Berm to Mitigate the Effects of the Deepwater Horizon Oil Spill on Louisiana Marshes



Well Kill Team



USGS

BP schematic showing the well and relief well.